Novel Posterior Splinting Technique to Avoid Heel Ulcers

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Abstract: Heel ulcers are a costly and preventable complication of lower-extremity immobilization, but they still occur with some regularity. A technique using a short leg posterior splint that suspends the heel away from the splint is described. This modification completely removes pressure the heel to prevent decubitus ulcer formation. This technique is simple, inexpensive, and effective.

The short leg posterior splint is commonly used by orthopedic surgeons to immobilize the foot and ankle after injury. It can be applied in multiple settings, including the outpatient clinic and emergency department. It is typically reserved for ankle sprains and nonoperative foot and ankle fractures. It is also useful for operative fractures, either for temporary preoperative immobilization or for postoperative protection of fracture fixation and soft tissue management. A short leg posterior splint does not carry the risks of compartment syndrome or malleolar pressure ulcers associated with more restrictive immobilizations, such as circumferential casting or AO splinting with side gussets. However, decubitus heel ulcers due to a combination of pressure and moisture remain a concern (Figure 1).

Common methods used to prevent decubitus heel ulcers include padding the heel with extra layers of Webril (Covidien, Mansfield, Massachusetts) or with Curity 5×9-inch abdominal pads (Covidien). A more advanced and expensive technique using polyurethane foam cushions has also been described. Although these practices provide extra cushion between the heel and the splint, they do not completely unload the heel and make it difficult for moisture to escape, increasing the risk of skin breakdown.

The current authors present a simple method of splinting that removes pressure from the heel, allows moisture to escape, and involves no additional cost, time, or supplies.

TECHNIQUE

The patient is positioned supine with the affected lower extremity held by an assistant at the toes and just proximal to the knee posteriorly, with the ankle neutral and the knee in 90° of flexion. Webril is wrapped circumferentially with 50% overlap twice to provide 4 layers of Webril from the toes to just distal to the popliteal fossa, taking care to avoid pressure over the common peroneal nerve at the fibular neck. Extra layers of Webril padding are placed on the planter aspect of the foot and posterior to the proximal Achilles tendon. No extra padding is placed behind the heel or at the calcaneal attachment of the Achilles tendon.

When they are approximately 2 cm in diameter, 2 of the used Webril rolls are saved and set aside. Four- or 5-inch Ortho-Glass (BSN Medical, Inc, Charlotte, North Carolina) or plaster is applied posteriorly along the length of the Webril, ensuring adequate padding between the splint material and skin at the proximal and distal ends.
When using plaster, extra caution must be used with water temperature, padding, splint thickness, and inadvertent placement of the extremity onto insulating material (e.g., plastic-covered hospital pillow) that may cause a partial- or full-thickness skin burn. To create a space to unload the heel, the 2 saved 2-cm rolls of Webril are inserted deep into the splint material and superficial to the Webril posterior to the heel and the attachment of the Achilles tendon (Figure 2A).

An elastic bandage is then wrapped loosely to secure the splint in standard fashion. After the splint material has hardened, the 2 small rolls of Webril are removed (Figures 2B, C) and the ACE bandage is readjusted back to its original position (Figure 2D).

**DISCUSSION**

To the authors’ knowledge, this heel suspension short leg posterior splint has not been described previously in the literature. It provides a simple and inexpensive method of preventing what can be a costly complication of lower-extremity immobilization.

A recent study of 216 patients with lower-extremity casts reported a 17.6% rate of heel pressure ulcers. Although no studies have examined the financial costs of heel pressure ulcers from casting, a significant body of literature examines the economic and legal costs of heel ulcers in general. The cost of treating a single heel pressure ulcer is estimated to be between $2000 and $30,000. These estimates are for general heel pressure ulcers and do not account for the additional costs in the presence of an operative fracture, such as delays in fixation and difficulties with bone and hardware coverage.

The described splinting modification removes pressure from the heel and better ventilates the most dependent aspect of the splint without sacrificing immobilization strength. Although all patients are instructed to follow heel precautions, which involves avoiding direct pressure over the heel of the splint, this splint protects the heel in patients who are unable or refuse to comply with these recommendations.

Patients with signs of heel soreness at splinting have been shown to be at significantly increased risk of heel ulcers when immobilized and would benefit from this modification. This splinting technique is particularly helpful when heels are at an increased risk of skin breakdown from moisture. This includes patients with pitting edema, serous drainage from incisions, or calcaneal traction pin sites.

Although useful for all patients, this splint is most valuable in patients at increased risk of heel complications secondary to diabetes mellitus, neurologic disorders, noncompliance, and draining wounds. In the authors’ experience with this splinting modification over the past year, no heel ulcers have developed.

**REFERENCES**